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T. L. Gilbert

Iowa State University

E. L. Egger

Colorado State University

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Management of Casualty Birds of Prey

by
T. L. Gilbert, DVM*
E. L. Egger, DVM, DACVS**

INTRODUCTION

Increasingly, practitioners are presented with injured raptors, either found as wild birds or kept as trained falcons. Orthopedic injuries are the most common result of trauma to birds of prey.²⁵ While many of the principles of mammalian medicine and surgery can be applied to avian species, raptors present special problems of management, restraint and handling, diagnosis, anesthesia, fracture healing and repair, and rehabilitation. Avian medicine is a new and developing field; sources of information are still limited and sometimes contradictory.

MANAGEMENT

Raptors should be housed in a warm (80–85F) semi-dark environment to reduce stress.^{18,20} A low perch should be provided. Bedding is not necessary, and wood shavings in particular are to be avoided as they may promote *Aspergillus* infection.²⁵ The cage or box should be covered to prevent drafts and visual stress on the bird. A large, heavy cardboard box may be best as wire cages frequently lead to feather injury. Maintenance of the bird's plumage is extremely important; broken tail or primary wing feathers impair flight ability. A tail sheath made from a manilla folder or x-ray film helps protect the long tail feathers from damage.^{18,20}

Diet should consist of whole animals; mice and chicks are most commonly fed.^{18,20,25} A supply of frozen whole mice may be kept and thawed as needed. Bones and fur, while beneficial parts of the diet, should be withheld from severely debilitated animals as they may

be unable to regurgitate the pellet.²⁵ Such birds may be force-fed ground food, but should be started on whole animals as soon as possible. Raptors on whole-animal diets normally cast the pellet the day after the meal.²⁵ Fresh water should be provided; although many raptors do not drink, they may use the water for bathing.²⁰

RESTRAINT

Physical restraint of raptors is a special problem. The talons are the most dangerous weapon, but the bite of these birds, particularly owls and eagles, may be painful.²⁵ In addition to protecting the handlers from injury by the bird, the bird and its plumage must be protected from injury by the handlers. Handling any raptor, wild or trained, stresses the bird and should be kept to a minimum.

Captive raptors are more easily managed because they are usually presented wearing a hood, jesses, and leash. These birds can be grasped from behind while perched on the trainer's fist, with both hands around the wings and breast, holding the flexed legs up against the body.^{11,25}

Wild raptors are still fearful of humans and tend to struggle less fiercely once restrained. These birds can frequently be immobilized by throwing a towel over them, then quickly grasping the legs with one hand and controlling the head with the other.¹¹ The bird may be wrapped in the towel to aid restraint during examination or treatment.²⁵ Owls may resist capture by lying on their backs and throwing their talons at the handler. They may be safely caught by allowing them to firmly grasp a heavy leather glove, then catching their legs from behind.¹¹ Small hawks and owls can be held with the legs, tail, and primary wing feathers in one hand, and the head in the other hand.¹¹ If one of the handlers is taloned, the

*Dr. Gilbert is a 1982 graduate of the Iowa State University College of Veterinary Medicine.

**Dr. Egger is an assistant professor at Colorado State University Veterinary Teaching Hospital, Ft. Collins, CO.

leg must be straightened to assist prying off the talons.^{11,21} Large raptors may require injection of an anesthetic such as ketamine^a or possibly must be killed before they will relax their grip.¹¹

DIAGNOSIS

Upon presentation, a thorough physical exam should be conducted to assess the condition of the bird. Most wild birds will be severely debilitated because of the severity of their injuries, lack of food, and stress. A baseline weight should be obtained to evaluate future gains or losses.^{21,25} Some average weights of common raptors can be found in Table 1.

TABLE 1—

Average Weights of Common Raptors ²⁵	
species	weight range in ounces
Sparrow hawk	4½–6
Great Horned Owl	44–64
Red-tailed hawk	32–54
Eagles	120–176

The pectoral muscles should be palpated to assess the bird's general body condition. Atrophy of one side of the breast implies loss of function in that wing. Bilateral atrophy may be seen in falcons brought to hunting weight by the trainer.¹⁶ All of the bones and joints should be palpated for fractures, crepitation, and freedom of movement. Severe bruising over joints may prevent flight; bruises are more easily visualized if a small amount of alcohol is used to wet down the feathers.¹⁶ The feet should be examined for swellings suggestive of bumblefoot. Whitish plaques of *Trichomonas* or *Candida* may be evident in the mouth.^{16,21}

Whole-body radiographs are necessary for an accurate appraisal of the musculoskeletal system. They may reveal unpalpable fractures or luxations, or give an indication of osteoporosis secondary to dietary calcium and phosphorus imbalance. Blood and dirt should be cleaned away prior to radiography.¹⁸ Ventrodorsal and lateral views on ultra-detail cassettes are preferred.¹⁶ Sedation with ketamine (10mg/kg) may be used, but caution is advised in debilitated birds.¹⁸ Common problems best diagnosed radiographically include shoulder and coxofemoral luxations, and fractures of the pectoral girdle.¹⁶

Hematology is a useful tool for assessing the raptor's physiological condition. A simple PCV and total protein give a good indication of anemia, hydration state, and nutritional state (hypoproteinemia). White cell counts are not

commonly done because of the unique morphology of avian blood cells. Some average blood values for raptors can be found in Table 2. Either the cutaneous ulnar vein, as it crosses the ventral elbow, or the brachial vein at the midshaft of the ventral humerus may be used for blood collection (or intravenous injections).¹⁸

TABLE 2—

Normal Blood Values of Raptors ¹⁸	
PCV	35–42%
Total protein	3.4–4.5mg%
WBC	20,000/ml

ANESTHESIA

Prior to anesthesia and attempted repair of injuries, attention should be directed toward supportive therapy. Depending on the condition of the bird, this may include fluid replacement, corticosteriods, antibiotics, vitamins and feeding.¹⁸ Some birds may require force-feeding, as mentioned previously; energy can be provided to birds too weak to eat with six to eight cc of 10% dextrose in lactated ringers intravenously.²⁵ Fluids may be given subcutaneously in the axillary region, inguinal fold, or back of the neck.^{18,25} Some commonly used drugs and dosages are given in Table 3.

TABLE 3—

Commonly Used Drugs and Dosages ²³	
Ampicillin	25mg/lb bid IM
Gentocin	.05cc/lb tid IM
Chloromycetin succinate	3–5mg/lb bid IM
Dexamethasone	.25cc/1.5lb sid IM, IV

Once stabilized, the bird is ready for treatment of its injuries. As avian anesthesia is particularly tricky, simple procedures should be performed without, if possible. Many different combinations and dosages have been used. For short procedures ketamine and combinations of ketamine, acepromazine^b, diazepam^c, and xylazine^d have been used. Ketamine alone has the disadvantage of poor muscle relaxation and possible seizures.¹⁷ Addition of one of the other agents provides better muscle relaxation and smoother induction and recovery. Redig and Duke, 1978, give two regimens: 1) ketamine

^a Ketaset, Bristol Laboratories, Syracuse NY 13201.
^b Acepromazine, Ayerst Labs, New York, NY 10017.
^c Valium, Hoffmann-LaRoche, Inc, Nutley, N.J.
^d Rompun, Baychem Corp, Kansas City, MO 64120.
^e Vetrap, Animal Care Products/3M, St. Paul, MN.

30–35mg/kg, diazepam 1.5mg/kg IV; and 2) ketamine 25–30mg/kg, xylazine 2mg/kg IV.¹⁸ Other dosages and combinations are ketamine 20–40mg/kg IM;²¹ ketamine 4–10mg/lb, acepromazine .4–1mg/lb IM;²⁵ or 3–5mg/kg IM of a 1:1 ketamine and xylazine mixture.¹⁶ Dosages for nocturnal raptors are lower.^{16,17}

Longer procedures may be done under gas anesthesia with a non-rebreathing circuit.¹³ Halothane or methoxyflourane can be administered via face mask or endotracheal tube. Use of a face mask results in a large volume of dead space, so high oxygen flows should be used.¹³ Halothane induction concentrations are 2.5–3%, maintenance concentrations are 1–1.5%.¹³ Induction can be achieved either by ketamine 10mg/kg IV,¹⁸ or by masking down without preanesthetic. Mask induction may be started with equal parts of oxygen and nitrous oxide, slowly adding increasing concentrations of halothane.²⁶ Respiration can be controlled in the intubated bird by handbagging 10–12 times per minute at pressures of 7–10cm H₂O.²⁶

Criteria for depth of anesthesia in birds are rate of corneal and palpebral reflexes, heart rate, and response to painful stimuli.^{16,26} Birds retain ocular reflexes in surgical planes of anesthesia; the reflex is sluggish in surgical planes, becomes more rapid as the bird lightens, and is abolished as the bird becomes too deep.^{16,26} A baseline heart rate may be obtained prior to anesthesia; increases or decreases of 40–50 beats per minute indicate lightening or deepening of anesthesia, respectively.²⁶ Since inhaled gases go to the posterior air sacs prior to passing through the lungs for gas exchange, there is a lag time between changes of inhaled vapor concentrations and changes in depth of anesthesia.²⁶ Therefore, careful monitoring of anesthetic depth is essential.

HEALING AND FRACTURE REPAIR

The objectives of avian fracture repair are the same as those of mammalian orthopedics: accurate reduction, rigid fixation, prevention of infection, and restoration of function. Raptors, however, require a much higher degree of function to survive as hunters.¹⁹ A slight degree of malunion or joint stiffness can produce an almost crippling dysfunction.¹⁹ Another consideration is the weight of the fixation appliance; heavy devices are not well tolerated and the bird may be unable to bal-

ance. For this reason, intramedullary pins should always be removed before release.^{1,6,12}

Under optimal conditions of alignment and stability, the time required for healing may be as short as 10–21 days.⁷ Unfortunately, raptors usually present with injuries of a severity that precludes optimum conditions. Wing fractures, in particular, may be difficult to reduce and stabilize because of the tremendous distraction created by the powerful flight muscles.^{7,18}

Although many avian bones are pneumatized, reducing the amount of marrow, there appear to be no significant differences in healing from the process seen in mammals.^{7,14} Callus forms from the periosteum, endosteum, and surrounding connective tissues; callus formation does not depend on organization of blood clots at the site.^{8,14}

Several types of internal and external fixation can be used in avian fracture repair. Splinting and slings, half-pin splintage, and intramedullary pins are the most frequently utilized techniques. Bone plating has found limited use in birds because of the small size of the equipment required, the extensive surgical exposure and time, and the thin, brittle cortices of avian bone.^{5,18} Internal fixation offers the best reduction, fastest union, smallest callus, and prevention of muscle atrophy; its disadvantages are increased soft-tissue disruption, increased risk of infection, and increased surgery time.^{15,5}

Frequently, fractures heal well with cage rest or the application of a simple sling. Fractures of the pectoral girdle, metacarpals, and tarsometatarsus are best handled conservatively.^{18,19} Immobilization of the wing can be achieved by simply taping the folded wing to the body.¹ Self-adhesive tape or Vetrap[®] are best because they don't damage the feathers.²⁴ Many wing fractures align well when the wing is flexed.²⁴ The major disadvantage of slings and splints is disuse atrophy of the muscles and joint stiffness, resulting in longer recovery time.⁴ Occasionally excessive callus forms which may impede function.²⁴ If a splint is applied to a tibiotarsal fracture, the talons should also be splinted in extension over a ball to facilitate the return of grasping function after healing.²³

Half-pin splintage (Kirschner-Ehmer or KE devices) provide good rotational stability and compression.⁴ They can be used in combination with intramedullary pins to provide rotational stability, or alone.^{4,5} Ideally, at least two

pins should be placed on each side of the fracture site.⁵ A recent modification of the Kirschner splint is particularly useful in peri-articular fractures of the distal humerus and femur.¹⁶ Two wires can be placed in the proximal humeral fragment, one in the distal fragment, and two in the ulna. With the elbow in flexion, a U-shaped piece of Hexcellite is wrapped around all the pins. This device is lightweight and well-tolerated by the bird.

Intramedullary (IM) pinning is useful for many fractures. Major limitations are the expertise of the surgeon and rotational instability. The thin avian cortices make placement difficult, and placement of the pins through a joint is difficult to avoid. One author reports an instance of bone necrosis following intramedullary pinning of the distal humerus of an osprey.⁹ Histopathologic examination implicated ischemia as the cause of necrosis; possibly the IM pin obstructed the nutrient artery. The authors suggest using IM pins slightly smaller than the intramedullary space to avoid this problem. This occurrence has not been reported by other investigators. Detailed descriptions of surgical approaches and techniques may be found in the chapter, "Orthopedic and Soft Tissue Surgery in Raptorial Birds", in Fowler's *Zoo and Wild Animal Medicine*.¹⁹

A new technique of internal fixation utilizing polymethylmethacrylate bone cement has been reported.^{2,3} The cement is injected into the intramedullary canal as the fractured bone is held in alignment. The cement hardens within about ten minutes, forming a friction bond rather than an adhesive one.³ The advantages of this technique are reduced surgery time, reduced tissue trauma, accurate lightweight fixation not requiring removal, and little required follow-up.

REHABILITATION

An important consideration in the release of a raptor is the bird's relationship with humans. It is extremely important to resist the temptation to tame wild raptors. If these birds lose their fear of humans, they are only more likely to be re-injured or killed following release.¹⁰

It is difficult to determine whether a raptor can fly well enough to survive in the wild once recovered. A raptor may fly well in a straight line but lack the maneuverability necessary to capture prey.¹⁰ Some birds recover well from their injuries, but as a result of long confine-

ment, are too out-of-condition for successful release.²² A large flight cage assists the evaluation of flight ability and provides adequate exercise. If such a cage isn't available, the bird may be tethered on long jesses to a perch for exercise.²²

The time of year is another consideration. Many species will not do well if released in the winter months.¹⁸ Red-tailed hawks, Great Horned owls, screech owls, and eagles can usually be safely released in winter. Before release, the bird should be gradually acclimated to outdoor temperatures.¹⁸

CONCLUSION

As the public interest in wildlife and conservation increases, veterinary practitioners are presented with more wildlife. Raptors hold a particular fascination for many people. Treatment of raptors and rehabilitation to the wild can be a rewarding experience. It presents many unique problems and challenges, but these can be managed more easily with new techniques being developed and as the practitioner becomes experienced in raptor medicine, surgery, and management.

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SAVMA SYMPOSIUM



Thanks to a very welcome and needed donation of \$1000.00 by the ISU College of Veterinary Medicine Alumni Association, Iowa State was able to charter a bus to send this amazing group of students to the S.A.V.M.A. Educational Symposium.

The symposium was held at Kansas State University during Spring break, March 18-20. With the people who rode the bus and those who drove, ISU had over 150 students and spouses attending, giving us the Best Attend-

ance Award for Veterinary schools in the United States.

The theme of the symposium was Challenge of '82 and featured two days packed with lectures by authorities on a variety of subjects. Next year's symposium will be held at Michigan State University under the theme All Ideas Great and Small. Once again we would like to express our sincere gratitude to the Alumni Association for their donation and support.